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ABSTRACT

This study to determine effects of preschool training of mentally retarded children from low-income families asks three major questions: 1. Does preschool training displace the rate of development of such children? 2. Does rate of growth continue at an accelerated rate, or does it return to the original rate of development during primary school years? 3. Are the results similar for children living in different environments? Five intervention programs are outlined: 1. Traditional nursery school; 2. Community Integrated program; 3. The Montessori method; 4. Karnes structured cognitive plan; and 5. The Bereiter-Englemann (B-E). As a result of the program, some children in the demonstration center no longer function in the retarded range. Behavior has improved and several have entered a public school or preschool for normal children. It is suggested that mothers of infants might accomplish more at home with guidance, since professional tutoring is not feasibly practical, and children with higher IQ need special early programming to attain their potential. (RG)

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THE EVALUATION AND IMPLICATIONS OF RESEARCH WITH YOUNG HANDICAPPED AND LOW-INCOME CHILDREN AT THE INSTITUTE FOR RESEARCH ON EXCEPTIONAL CHILDREN AT THE UNIVERSITY OF ILLINOIS

Merle B. Karnes

The interest of the Institute for Research on Exceptional Children (IREC) at the University of Illinois in young handicapped and disadvantaged children dates back to the late '40s. At the start of this period, Samuel A. Kirk, then director of IREC, with supporting funds from the National Institute of Mental Health, U.S. Public Health Service, and the Illinois State Department of Public Instruction in cooperation with the Champaign public schools and Lincoln State School and Colony, launched a five-year pioneer research project with young mentally retarded children, the majority of whom were from low-income families. The author considers herself to be most fortunate in that she was enlisted to direct the educational program.

The purpose of this early, foresighted study (Kirk, 1958) was to determine the effects of preschool training on the development of mentally retarded children. Uniquely, one experimental group was located in a community setting and the other experimental group in an institution for the mentally defective. Contrast groups were identified for both of the above groups. According to Kirk (1958, p. 9), the three major questions the research purported to answer were:

"1. Does preschool training of mentally retarded children displace the rate of development of such children as compared to children who do not obtain the benefits of early training?"

"2. Does the rate of growth at the preschool age continue at an accelerated rate, or does it return to the original rate of development during the primary school years?"

"3. Are the results similar for children living in different environments, such as their own homes, foster homes, or institutions for the mentally deficient?"

As an aside, this project was the first in the College of Education at the University of Illinois to obtain outside funding. In this day and age when federal funding is more or less taken for granted, it is interesting to recall what a stir this project made locally because up to that time outside funding was virtually nonexistent.

The treatment efforts were focused on enhancing the social and mental development of young educable mentally handicapped children ages 3 through 6 with Binet IQs ranging from 45 to 80. The children (N = 81) were examined prior to the experiment, at regular intervals during the preschool period, at the termination of the preschool project, and at regular intervals following the preschool period. Follow-up for some children occurred as long as five years after they left the preschool.

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Briefly, the overall results of the experimental project indicated positive changes. Seventy percent of the children demonstrated accelerated rates of

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development and retained these gains, according to follow-up data. Children who remained at home without benefit of preschool experience either maintained their previous rate of development or decreased their rate of development. Generally, the greater the change in the environment of the child, the greater the change in rate of development. As is true of most preschool projects to date, "summative evaluation" (Scriven, 1967) characterized the research design.

One finding that is of particular interest to those who are concerned about the irreversibility of the effects of prolonged deprivation associated with being a member of a low-income family is that Kirk's community contrast children demonstrated an accelerated rate of growth after they entered first grade at age 6. Kirk concluded that age 6 might not be too late to initiate an educational program for children similar to those included in this project. This finding is of particular interest since these children either maintained or showed a decrease in their rate of development during the preschool years.

While none of the subjects of this study has graduated from a university with a graduate degree at the master's level, as did one of Skodak's and Skeels' (1945) subjects, there have been dramatic cases in Kirk's study. Notably, one institutionalized child who was placed in an adoptive home and moved to the community experimental class has graduated from a university with an above-average record and is currently a public school teacher at the secondary level.

When one reads Kirk's report (1958) of this early study, which was initiated a quarter of a century ago, one cannot but be discouraged that progress to date has been so slow. For example, Kirk made a plea for what has come to be known as "formative evaluation" (Scriven, 1967) to help guide the discovery of better ways of meeting the individual needs of children and to determine why some children make progress and some do not. Kirk (1958, p. 205) pointed out in his final report, "These results, though affirmative, do not tell the whole story. They do not tell us what kinds of children, and under what circumstances these children, made the most progress. They do not tell us why some children did not make progress." In spite of his plea, we are just now getting around to developing formative evaluations of our programs.

Kirk also pointed out the need for environmental changes outside the boundaries of the classroom, especially for those children who are psycho-socially deprived. He felt that a total impact was a necessity to bring about changes in the environment conducive to helping the handicapped child develop his potential. Even prior to Hunt's (1961) monumental contribution in the form of a book dealing with intelligence and experience, Kirk (1958, p. 212) pointed out that the findings of his study in regard to the concept of fixed intelligence suggested that although the contention was true within limits, an enriched environment during the preschool years can accelerate the rate of intellectual growth.

The Kirk approach to preschool educational programming modified traditional models. In his preschool, a great deal of attention was given to the specific needs of the individual child. There was a real attempt to gear instruction to the cognitive development of the child. The teacher-pupil ratio was 1 to 4, and in some instances tutoring was provided for individual children. Although language development was deemed to be of great importance in the cognitive

development of the children, there was no instrument available to determine the child's strengths and weaknesses in psycholinguistic areas. Thus, there was no assistance to the teacher pointing the way to developing an individualized instructional program which would help the child ameliorate his weaknesses. It was at this time that the need for the Illinois Test of Psycholinguistics was conceived and the development initiated.

Despite the fact that an entire book detailing this program has been made available to the field, there is little evidence that service programs utilized the findings of this study. Over the years, many researchers have plowed the same field and have come up with relatively the same findings. Certainly, efforts to determine whether preschool programs for young handicapped and/or disadvantaged children are beneficial or not has been answered repeatedly. Further efforts to answer that yes-or-no question would seem to be a sheer waste of time and financial resources.

The most impoartant criticism that can be leveled at Kirk is that he failed to deliver his message to the field. It is obvious that a written report is not sufficient to narrow the gap between research and practice. One need that comes through loud and clear is that researchers in the field must develop viable ways of disseminating their research findings and evaluating the delivery systems so that we can be more assured that the people who need new knowledge the most will have access to this new knowledge in ways that are readily accessible and readily consumable.

The institutional preschool program initiated by Kirk in 1948 has contined to operate over the years. The community preschool program as is typical of so many research projects, died its natural death as soon as the funds expired. Despite the fact that the community preschool was a part of the Champaign public schools and that the present author became director of special education in the Champaign schools and remained in that position for twelve years, she was never able to sell the idea of the community's supporting a preschool such as Kirk's even though the results of providing preschool for young mentally retarded children were well documented and were known to the constituents.

Although Illinois continues to be one of the leaders in special education, it was not until this past summer (July, 1971) that legislation was enacted to make mandatory by July, 1972, special education for handicapped children at the preschool years down to age 3. Presently, the University of Illinois has the only training program in preschool education of the handicapped in the state. In addition, there is an on-going demonstration project for the multi-handicapped supported by the Bureau of Education for the Handicapped. Both are under the direction of the author. Also connected with the demonstration project is a well-developed delivery system which will be described later in this paper.

To better understand the development of these programs, it may be helpful to trace the history of their development. In the fall of 1965 I joined the staff of the Department of Special Education and the Institute for Research on Exceptional Children at the University of Illinois to become the overall director of a research program on preschool disadvantaged children supported for a period of three years by the Cooperative Research Branch of the U.S. Office of Education. Other researchers in this center over the first three years were Samuel A. Kirk,

Carl Bereiter, Siegfried Engelmann, Ernest Washington, Bernard Farber, Michael Lewis, and David Harvey. At the end of the three-year grant period, Karnes continued her work under grants from the Office of Edonomic Opportunity, the Office of Child Development, the Bureau of Education for the Handicapped, and the Illinois Superintendent of Public Instruction.

The research during the first three years fell into two broad catagories: (1) sociological research focused on those social variables in lower-class families which were expected to affect intellectual and educational development (Farber et. al., 1969) and (2) educational research which focused on developing and testing various curricular interventions for the disadvantaged child (Kirk & Karnes, 1969; Bereiter et al., 1969). This paper concerns itself with only the programmatic research on curricular interventions. Eseentially, the research was directed toward answering these four major questions:

1. What kind of intervention is most effective?
2. How long must intervention be continued to stabilize effective functioning?
3. What is the most strategic age for intervention?
4. Can an effective educational intervention be implemented by mothers in the home and by paraprofessionals functioning as teachers in the classroom?

What Kind of Intervention is Most Effective?

In 1965, Karnes undertook a study to determine the differential effects of five preschool interventions. Assessment of differences was evaluated through batteries of standardized tests adminstered prior to the intervention, following the preschool year, and at the end of the kindergarten year. In addition, the effects of three of these programs were evaluated over a five-year period.

These comparative studies conducted at the University of Illinois provide the most extensive comparative findings to date. New knowledge was obtained from these studies which has influenced the direction of our programmatic effort at the University of Illinois.

The classroom programs in the five model preschool intervention studies were chosen on theoretical as well as practical bases. One major consideration was degree of structure along a continuum from the traditional nursery to the highly structured preschool. The nature of teacher-child interaction was considered to be the critical dimension of structure: as the specificity and intensity of this interaction increased, so did the degree of structure. Two programs (Traditional /K$_2$/ and Community-Integrated) represented the less structured end of the continuum; a third (Montessori) embodied an established theory which included much that can be identified with a child-centered or traditional approach and a methodology which incorporated considerable structure; the fourth (Karnes / K$_1$ /) and the fifth (Bereiter-Engelmann / B-E /) programs fell at the highly structured end of the continuum.

Comparability was initially sought by identifying 75 children who met age (CA 4-0) income, family history, and no previous preschool experience criteria. In addition, children were administered Stanford-Binet Individual Intelligence Test, Form L-M, and stratified into three groups on the basis of these IQ

results (100+, 90-99, 70-89). Children were then assigned to classes such that there was comparability of IQ, sex (50-50), and race (67% black and 33% white). Finally, each class unit was randomly assigned to a particular intervention group--B-E (1 class), K_1 (2 classes), K_2 (2 classes).

During the second year of the project the above procedures were followed resulting in comparable groups assigned as follows: B-E (1 class), Montessori (1 class), and Community-Integrated (a total of 16 children assigned to middle-class community preschools). A multi-variate analysis of covariance was then used as the basic statistical technique for analyzing the data.

After two years, then, there were two classes each (N = 15 per class) of the B-E, K_1, and the K_2 programs and one class each of the Montessori and Community-Integrated. The Community-Integrated, Montessori, and Bereiter-Engelmann programs were directed by their own staff. Karnes directed the K_1 and K_2 programs. In each program, children attended daily sessions of approximately two hours and fifteen minutes five days per week for a period of no less than seven nor more than eight months.

The five programs of classroom intervention may be distinguished as follows:

1. The major goals of the Traditional nursery school program (K_2 were to promote the personal, social, motor, and general language development of the children. Karnes directed this program and instructed the teachers to capitalize on opportunities for incidential and informal learning, to encourage the children to talk and to ask questions, and to stimulate their interest in the world around them. Music and art activities were scheduled regularly. There was a daily story period. Outdoor play was a part of the daily routine; indoor play focused on centers of interest. Through inservice training, the teachers were made aware of the strengths and weaknesses of disadvantaged children. This preschool was modeled after the Child Development Laboratory program at the University of Illinois.

2. The Community Integrated program operated at four neighborhood centers, provided a traditional nursery school experience similar to the one above. These centers were licensed by the state and were sponsored by community groups. Classes were composed predominately of middle- and uppper-class Caucasian children. Two to four disadvantaged children from the research pool attended sessions at one of these four centers. Socio-economic integration was the pertinent variable rather than racial integration, which was achieved in all programs. Central to the altered classroom dynamics in the Community-Integrated program was the presence of an advantaged-peer language model in addition to the teacher model provided in all programs. To the extent that all children in a traditional nursery school acquired language from each other, the Community-Integrated program provided the optimum setting for verbal development. Observational data, however, revealed that the disadvantaged were on the fringes and interacted little verbally with the other children.

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3. The Montessori program was administed by the local society, and staff and classroom materials met Montessori standards. The daily scedule began with a routine health check and toileting. The group then met "on the line" for conversation, songs, fingerplays, and exercises. The next half hour was devoted to "spontaneous choice" of approved materials and was followed by a second period

on the line devoted to musical activities, stories, and games. A "practical life" demonstration, juice time, toileting, the silence exercise, and tidying the classroom occupied the next half hour. The final ten or twenty minutes of the session were given over to playground activities or supervised short walks. The specific nature of the "prepared environment" raised the level of structure within the Montessori classroom beyond that of the two traditional programs. The Montessori teacher did not, however, maintain the high level of specific control over the actions of the children provided by the teachers in the two highly structured programs. Structure in the Montessori program did not usually derive from direct teacher-child interaction but rather from the prescribed manner in which the child learned from the materials. Observational data revealed that there was very little verbal interaction among the children and between children and adults as compared to the two highly structure programs of Bereiter-Engelmann and Karnes (K_1) programs and to a more limited extent the K_2 (Traditional) program.

4. In the Karnes structured cognitive program (K_1), a psycho-linguistic model derived from the clinical model of the Illinois Test of Psycho-linguistic Abilities was used to guide instruction. Since inadequate language represented one of the greatest problem areas for the low-income child, verbalizations in conjunction with the manipulation of concrete materials were considered to be the most effective means of establishing new language responses. Each class was divided into three groups of five children, initially on the basis of IQ and teacher evaluation. A game format (card packs, lotto games, models and miniatures, sorting, matching, and classifying games) created situations where verbal responses could be made repeatedly in a productive, meaningful context without resorting to rote repetition. If the child was unable to make a verbal response, the teacher supplied an appropriate model. When the child began to initiate such responses, the teacher had the opportunity to correct, modify, and expand his verbalizations. Particular prominence was given to helping the child acquire the effective information-processing skills needed to cope successfully with school tasks (Karnes et. al., 1972). Each teacher taught three 20-minute structure periods to the same group of five children. The remainder of the morning was given to music, art, directed play, snack time, and rest.

5. In the Bereiter-Engelmann (B-E) program (Bereiter & Engelmann, 1966), intensive oral drill in verbal and logical patterns was chosen as the mode for instruction, since disadvantaged children were considered adequate in perceptual and motoric skills, but inadequate in verbal and abstract skills. Each B-E class was divided into small groups on the same basis as the K_1 group. Each of the three teachers conducted a 20-minute learning period (language, arithmetic, or reading) for the three groups. The general instructional strategy was that of rule followed by application. A verbal formula was learned by rote and then applied to a series of analogous examples of increasing difficulty.

The children were taught to read with a modified Initial Teaching Alphabet. Innovations had to do with instruction in the formation of long-vowel sounds and the use of a convention for blending words. As early as possible, the children were introduced to controlled-vocabulary stories written by the reading staff. Songs were especially written for the music period and provided practice in language operations as did story period.

Results and Conclusions at the End of the Preschool Year

Children were tested on Saturdays rather than being taken from the classroom and possibly revealing classroom placement. Individual test data were obtained by experienced school psychologists who were assigned to test the children on a "blind basis." Thus, except for an occasional inadvertent disclosure, the results were essentially obtained without the knowledge of assignment to programs. Psychologists were encouraged and provided the time to establish rapport with the children. These psychologists had had previous experience working with this age and type of child.

The two highly structured programs (K_1 and B-E) demonstrated a substantial mean gain (14 points) in intellectual functioning (Binet IQ) (Figure 1) at the end of the first year (7- to 8-month interval). No child in either program failed to make an IQ gain, and 92 percent of the children in the K_1 program and 74 percent of the children in the B-E group fell in the above-average intelligence strata. The other three experimental groups made more modest mean gains (5 to 8 points), and from 15 to 24 percent of these children regressed. Clearly, the test-two performance of the K_1 and B-E groups on the Stanford-Binet was superior to the performances of the other three groups. Although the K_2 group was not significantly lower than the K_1 or the B-E groups, neither was it significantly higher than the Community-Integrated or Montessori groups. (A discussion of the results of Battery 3 appears later.)

On the initial assessment of language development (ITPA), the children in this study were most deficit on the three subtests related to verbal expressive abilities: Vocal Encoding, Auditory-Vocal Automatic, and Auditory-Vocal Association. During the treatment period, the K_1 group eliminated their initial major deficiencies (6 to 15 months below CA) on each of these three subtests (Figure 2), while the B-E group eliminated a major deficiency on two of these three subtests. The K_2 group made improvements in all three areas but not to the extent of the B-E and K_1 groups. The performances of the Community-Integrated and Montessori groups on these three subtests were static at best. On the ITPA total, the K_1 group was significantly higher than the Community-Integrated and Montessori groups but did not differ significantly from the B-E and K_2 groups. The B-E and K_2 groups were significantly higher than the Montessori group only.

The magnitude of the gains of the K_1 group on the nine subtests of the ITPA and the consistency with which it made these gains resulted in an essentially nondeficit test-two performance. The K_2 group made consistent but more modest gains and has no major deficits (deficits in excess of 6 months) at the time of test two. The B-E group made somewhat larger gains than the K_2 group but made these gains somewhat less consistently and had major deficits on two subtests at test two. The Community-Integrated and Montessori groups generally made smaller and less consistent gains than the other three groups. The movement of the Montessori group was such that the children decreased their rate of development in language while that of the Community-Integrated group was more nearly static.

The performance of the K_1 group in visual perception (Frostig, 1964) at the end of the first year was significantly higher than those of the other four groups. Only 21 percent of the children in the K_1 group scored at a level that indicated need for remediation, while 43 percent of the children in the B-E

group revealed such a need. Over 75 percent of the children in the K_2, Montessori and Community-Integrated groups earned deficit scores.

Since the five intervention programs were chosen to represent points along a continuum of structure, one might assume that the results would order themselves along this continuum to the extent that structure is a valid dimension in effecting change. Such was not the case. The children in the K_1 and B-E programs (high on the structure continuum) generally showed the greatest gains. Those who participated in the K_2 program (low on the structure continuum) showed more modest gains. Children in the Community-Integrated program (also low on the structure continuum) and those who participated in the Montessori program (midway on the structure continuum) showed the least progress.

The failure of the Montessori children to demonstrate appreciable progress seems to invalidate the notion that the level of structure relates to the progress made by the disadvantaged child. The Montessori program provided a high degree of structure in terms of careful planning for the kinds of motor-sensory activity appropriate to the development of an adequate base from which language and cognitive skills arise, and these provisions may be considered comparable to the activities used to elicit verbal responses (the game format) in the K_1 program or to the pattern drill employed in the B-E program. The Montessori teacher provided a "prepared environment" but did not systematically engage the child in verbalizations or require such verbalizations as part of the definition of productive involvement. This failure of the Montessori program resulted, at least during the intervention interval, in somewhat regressive language behavior. Structured emphasis on motor-sensory development without similar concern for verbal development programmatically moves in the wrong direction for the disadvantaged child.

The expectation that children in the Community-Integrated group would show progress equal to or greater than that of the children in the K_2 group was not substantiated. The disadvantaged children in the Community-Integrated program failed to incorporate the language model of their advantaged peers because they did not reciprocate in verbal interactions at any significant level. The program of the K_2 group, on the other hand, ensured that the children responded verbally during certain activities. Their teachers necessarily accommodated these activities to the verbal level of the children and gradually developed more acceptable and extended responses. The progress in verbal expressive ability made by the children in the K_2 program reflects this accomodation.

The very real progress made by the children in the K_2 program must be viewed against the generally superior performance of the children in the two highly structure programs (B-E and K_1). The magnitude and consistency of the gains of the K_1 and B-E groups in intellectual functioning (Binet IQ) clearly endorse the importance of providing a setting in which the child is required to make appropriate and increasingly complex verbalizations. There is some evidence that obtaining these verbalizations in conjunction with productive, manipulative experiences (K_1 program) more effectively developed visual perceptual skills (Frostig) as well as the visual-motor skills involved in certain ITPA subtests (Visual Decoding, Visual-Motor Sequencing, and Motor Encoding). In addition, children who made verbal responses concurrent with meaningful, manipulative experiences more effectively incorporated syntactical constructs

into their verbal repertoire (Auditory-Vocal Automatic subtest). On the other hand, verbal pattern drills (B-E program) provided unique opportunities to develop the auditory reception of structured aspects of language (Auditory-Vocal Association and Auditory Decoding subtests).

Results and Conclusions at the End of Second Year (Kindergarten)

During their second year in the study, the children in the K_2, Community-Integrated, and Montessori programs attended a public kindergarten for a half day where no research intervention was made. In contrast, the children in the K_1 program attended public kindergarten in the morning and, in addition, participated in a one-hour supportive program at the research center in the afternoon. According to the research design, children in the B-E program were not to attend public kindergarten and were to return to the research center for a half-day program.

The children in the K_1 program were divided into two classes of twelve children each. The one-hour session consisted of two periods--language development/reading readiness and mathematics concepts. An effort was made to avoid r[illegible] peating activities which had already been provided in the morning public kindergarten and to emphasize activities directly related to first-grade academic success. Because the test-two performance of the K_1 group on all ITPA subtests had been essentially nondeficit, the major orientation of the s[illegible]portive program was toward school readiness rather than language development. Since these children had demonstrated competence in visual perceptual skills (Frostig) and a mean Binet IQ substantially above 100 (only two children scored below 100) and because they were approaching an age appropriate to more specific academic endeavors, this shift in program emphasis seem reasonable.

The B-E program in the second year of the study offered an extension of the first year's curriculum, and the children were again grouped by ability for 25-minute instructional periods in reading, arithmetic, and language. The language program included concepts of measure, the formal use of function, words, and the vocabulary engendered by a study of part-whole relationships of over 100 objects. The B-E staff developed a highly systematized reading method which emphasized sub-skills such as blending, rhyming, visual discrimination, left-to-right orientation, and sequencing. The children were taught to recognize symbols as sounds and to combine these sounds, using the sub-skills, into words. In arithmetic the children received further work in the curriculum initiated the first year, and no significant alterations were made.

At the end of the second year of intervention, the performance of the B-E group in intellectual functioning (Binet IQ) was superior to that of the other four groups (Figure 1). Only the children in the B-E group made a substantial gain during the second year (6 points). The four groups that attended public kindergarten the second year basically maintained the gains in intellectual functioning made during the first year; typically, losses or gains did not exceed 3 points. Although the supportive program for the Karnes group (K_1) was unsuccessful in fostering further IQ gains, it did result in gains in other areas as will be seeen later.

Of the three groups who attended only public kindergarten the second year, the Community-Integrated and Montessori groups demonstrated the least change on verbal expressive abilities (Vocal Encoding, Auditory-Vocal Automatic, and Auditory-Vocal Association). To simplify the reporting of these findings, the combined means of these scores are presented graphically in Figure 3. The K_2 group, although it had shown relatively good progress in these three subtests during the preschool year, tended to regress during the kindergarten year. The Montessori group, on the other hand, which had demonstrated a regressive pattern the first year, made substantial gains during the kindergarten year. The regressive performance during the second year of the K_1 group is particularly distressing since these children also attended a one-hour supportive program in reading and arithmetic readiness. Note, however, that language was not given primary emphasis the second year. The B-E group was the only group that showed continued and appreciable progress in language development over the two-year period and was at or above its chronological age on the three subtests related to rerbal expressive abilities. As reported earlier, the B-E children were provided with two-and-a-half hours daily of an intensive program with major emphasis on language development. <u>These results, together with the results on intellectual functioning, provide information to endorse the need for continued special programming, especially in language</u>.

On the assessment of <u>school readiness</u> (Metropolitan), the reading readiness performance of the K_1 group was significantly higher than those of the other four groups. The result is rather suprising in view of the B-E group's higher scores in intellectual functioning (Binet) and language development (ITPA). The failure of the B-E group to achieve school readiness scores superior to those of the other groups, especially the three groups who attended public kindergarten only, is puzzling since its curriculum included an intensive two-year reading program beginning at age 4. A major intent of the K_1 supportive program had been to prepare children for formal reading instruction, and this focus appropriately developed reading readiness skills as measured by the Metropolitan. Thirty-eight percent of the children in the K_1 program achieved a superior reading readiness status, and 67 percent of the children in this group were rated high normal and above. No child in the other four programs earned a superior rating, and from 15 to 31 percent of the children in these groups were in the high normal range. Nearly equal percentages of the children in these four groups fell in the high, average, and low ranges. The favorable reading prediction for the large number of children in the K_1 program is complemented by the few children who received low-normal ratings, less than one-fourth the percentage of any other group.

On the Metropolitan Number Readiness Test the K_1 and B-E groups were significantly higher at the end of kindergarten than the other groups. A substantially higher percentage of the children in the K_1 group (83 percent) achieved a superior number readiness status; however, the percentages of children in the K_1 and B-E groups who were rated high normal and above (91 percent) were identical and higher than those of the other three groups (48 to 64 percent). Apparently children from low-income homes of preschool and kindergarten age profit from academically-oriented instruction in mathematical concepts, and both programs seemed appropriate and effective with these children.

The one-hour supportive K_1 program was successful in fostering further development of school readiness (Metropolitan) and visual perception (Frostig).

Only the B-E group made consistent and continued progress in all areas over the two-year period. They were also the only one of the five groups that had two and one-half hours per day of special programming.

It seems clear that one year of preschool programming, no matter how immediately effective, did not equip disadvantaged children to maintain performance in the kindergarten setting. Regardless of the progress made in preschool by the four groups of children which attended public kindergarten, their relative performances deteriorated during the second year, which supports the current belief that typical public school kindergarten programming for disadvantaged children is inappropriate. Since one of the principal findings of the first year was that intensive teacher-child interaction is critical to maximum language development and since this kind of interaction cannot occur with the teaching ratio of the public kindergarten, the deterioration in language development is not surprising. Only children in the B-E program, which maintained a low pupil-teacher ratio and intensive pupil-teacher interaction the second year, made continuing progress in language development.

During the first year of the study, the K_1 programming was appropriate and highly effective, and the children made remarkable progress in all areas, particularly those of initial inadequacy. This encouraging educational prognosis contributed to a shift in emphasis from language development to school readiness in the one-hour supportive program. The marked regression in verbal expressive abilities experienced by these children during the kindergarten year suggests that this shift in emphasis was ill advised or at least premature. The additional one-hour supportive program did indeed promote superior academic readiness but failed to maintain the level of language functioning achieved in the K_1 preschool.

Only the children who attended the B-E preschool were provided low pupil-teacher ratios and intensive language programming over the two-year period, and only these children made continued growth in all aspects of the test battery. The second-year IQ gain of this group is particularly encouraging, as are the remarkable two-year gains in verbal expressive abilities. Only in the area of reading readiness did these children fail to achieve superior performance. This study offers no direct evidence to support the early introduction of reading instruction to disadvantaged children.

Results and Conclusions of a Follow-up of Three of the Five Preschool Interventions Over a Three-Year Period

Because not all of the interventions were initiated during the first year of the study, data at the end of first grade were not available for the Montessori and Community-Integrated groups or for the second Bereiter-Engelmann class at the same time analyses were made. Thus, follow-up data over three years were gathered on the K_2 group (N=25), the K_1 group (N=24), and the first class of the B-E group (N=10). Thus, the available N for the B-E group was reduced from 23 to 10, and therefore conclusions based on data obtained during the third year for this group must be tentative.

School achievement at the end of first grade was considered to be a critical criterion in assessing program effectiveness. The reading achievement of the K_1 and B-E groups as measured by the California Achievement Tests was significantly

higher than that of the K_2 group. Two years of reading instruction in the B-E program prior to first grade seems to have been only as effective as the extensive readiness preparation in the K_1 program in producing accelerated reading development. This follow-up study provides little evidence to support the introduction of early reading programs for disadvantaged children.

The K_1 and B-E groups were significantly higher than the K_2 group on the California arithmetic test at the end of the first grade, confirming the prediction that the structured groups would better prepare the children for the more formal work of first-grade mathematics.

The Binet performances of the three groups were clearly differentiated over the three-year period (Figure 4). Although some of the large initial IQ gain might be consonant with learning test-taking behavior, such an explanation does not account for the differences among groups after a constant for learning test-taking behavior is removed. Thus, some of the differences can be attributed to the effects of differences in programs. The performance of the K_1 and B-E groups was significantly superior to that of the K_2 group at the end of the preschool year. At the end of the kindergarten year, the Binet performance of the B-E group was significantly superior to that of the other two groups. (The K_1 group was very nearly significantly higher (.05) than the K_2 group.) At the end of the third year of the study, when all children were completing the first grade, there were no significant differences among the three groups. The modest preschool gain (8 points) of the K_2 group remained relatively stable during the following two years (5 points at the end of the first grade). Although the one-hour supportive program was unsuccessful in fostering a further gain for the K_1 group, it may have been responsible for maintaining the relatively large preschool gain (14 points). The K_1 group did, however, lose 6 points of this gain during the kindergarten and first-grade years. Only the B-E group received sustained special programming during the preschool and kindergarten years, and only the B-E group made large and continuing gains (13 and 10 points) during the first two years of the study. When special programming terminated and these children entered the first grade of the public schools, they experienced a sizable loss (11 points).

There were no statistical differences among the ITPA total performance of the three groups at the end of the third year of the study. All groups regressed during the first-grade year. The extent of the losses of the K_1 and K_2 groups during the kindergarten and first-grade years exceeded the gains they had made in the preschool year. Although the B-E group was performing at its chronological age, the loss experienced by this group during the first grade exceeded its gain of the kindergarten year and does not support an encouraging language prognosis.

All groups made progress during the first-grade year on the Frostig Developmental Test of Visual Perception; however, the K_2 group made a substantial gain and there were no longer significant differences among the groups. Initially, nearly all of the children fell in the lowest quartile on this instrument. At the end of the first grade, only 8 percent of the children in the K_1 group scored in the lowest quartile while 20 percent of the B-E children and 48 percent of the K_2 children earned such scores.

No intervention program was entirely successful in providing the impetus necessary to sustain at the end of the first grade the gains in intellectual

functioning and language development made during the preschool years. In spite of the disappointments of some of the longitudinal data, however, a major accomplishment of this study remains: Serious learning deficits of the disadvantaged children in the K_1 and B-E groups were eliminated during the preschool year. In the B-E program, where an extensive intervention was sustained over a two-year period, continued growth occurred. The deterioration in language and intellectual functioning which occurred at the termination of intensive programming demonstrates the need for continued intervention characterized by low pupil-teacher ratios which make possible the interaction necessary for language development and which provide the opportunity to design and implement learning experiences to achieve specific objectives.

Although these three short-term interventions (even a two-year classroom intervention is essentially a short-term effort) did not differentially alter intellectual functioning in any permanent fashion, two aspects of the Binet data have important implications. The sizable gain of the low-strata children in the K_1 group remained stable, most pertinently, during first grade when no research intervention was provided. It seems justifiable to conclude that the K_1 program offered particular opportunities to develop the intellectual functioning of low-normal and slow-learning children. The small number in each stratum of the B-E group precludes discussion of gains by strata. The IQ losses experienced by the high-strata children in both the K_1 and K_2 groups during the first grade are of real concern and resulted in an IQ change in a negative direction over the three-year period. The modest gain of the K_2 high stratum and the substantial gain of the K_1 high stratum during the preschool year remained constant through the kindergarten year but were lost during the first grade. It seems reasonable to assume that in important ways the public schools during first grade did not meet the needs of disadvantaged children with demonstrated potential. This assumption is further supported by the substantial regression during first grade of 24 of the 26 children from the three intervention groups who had scored 110 and above at the end of kindergarten.

Since the intent of preschool intervention for disadvantaged children is to alter in positive ways later school performance, both structured programs (B-E and K_1) must be judged successful. Vitrually all of the children in the two structured programs were making at least adequate academic progress. In spite of two years of traditional preschool programming, nearly half of the children in the K_2 group obtained California Achievement Test scores which indicated sharply limited school achievement. This differential achievement level demonstrates the potential for school success among disadvantaged children which can be developed through structured preschool experiences. Functioning effectively in the public school setting is a critical first step in altering the life circumstances of the disadvantaged child to the end that he may participate more fully in the educational and economic opportunities of a democratic culture.

Discussions and Conclusions on Follow-up Through the Third Grade of Three of the Five Programs

The results and analyses of follow-up data on intellectual functioning and reading achievement of K_1, B-E, K_2 are contained in Figures 4 and 5. The differences among the group in intellectual functioning as measured by the Stanford-Binet Individual Intelligence Scale had disappeared by the end of the

first grade (test four). The K_2 group had stabilized at test three at an IQ of 100, an overall gain of 6 IQ points. The B-E group lost 10 points in IQ from test three (when they entered the public schools) to test four. They continue to decline steadily over the next two years and at test six had an overall IQ gain of 7 points. The K_1 group took somewhat smaller losses through grade three and maintained an overall gain of 7 points.

The reading achievement of the three groups, as measured by the California Achievement Test, reveals significant differences among the groups through the third grade. At the end of the first and second grades, the K_1 and B-E groups were significantly higher than the K_2 group and were reading above or at grade level. At the end of the third grade, the situation had changed. The K_1 group was significantly higher than the K_2 and B-E groups, and the K_1 group was slightly above grade level. The B-E and K_2 groups were about one-fifth year below grade level and the K_1 group.

Generally, one can say from the longitudinal comparison of the three programs that the two programs that were initially most successful had a high level of verbal interactive behavior. These two programs (K_1 and B-E) were highly structured and characterized by careful planning toward academic-cognitive goals. At the end of the third grade, however, the one program that remained significantly higher than the other two on academic achievement was the K_1 program. The difference between the two initially more effective programs (K_1 and B-E) at the end of the third grade may well be attributed to the greater emphasis on divergent responses and teaching for transfer associated with the K_1 program.

Inspection of Figure 5 indicates that, based on initial IQ scores, the children might have been expected to achieve a grade placement score of 3.4, when tested the seventh month of the third grade. Thus, they would be three-tenths of a year behind expectancy at that point. The cumulative effects of such mild retardation at this point might well increase as the child progresses through school. Such a pattern is characteristic of the disadvantaged child. Further, there is some evidence to suggest that such children may well be expected to make much poorer progress without intervention. In contrast to the projected negatively accelerating rate of academic progress, the children in the K_1 program are almost a half year ahead of expected grade placement based on their initial IQ scores and consistent with academic expectations based on their test six IQ scores. It can be noted that the B-E and K_2 children might be slightly below their test six IQ based expectancy scores, although they are both above expectations derived from their expectancy scores based on their initial IQs.

A Comparison of Two Approaches (K_1 and K_2) on Social and Affective Behavior

One concern has been the differential effect of the programs on the social and affective behavior of children. Thus, in February, 1971, a report comparing the Karnes prescriptive cognitive program (K_1) with the Karnes Traditional program (K_2) was submitted to the Office of Child Development for inclusion in their publication on successful projects. In addition to a report on the findings in the cognitive area, which appears earlier in this paper, findings on the social and affective data were included and will be summarized here (Karnes et al., 1971b).

Social Area

Social development has been an area of concern in preschool education, since some educators feel that emphasis on cognitive development means neglect of social and emotional development. Because of the questions that have been raised, it seemed important to demonstrate, if possible, that the social and emotional behavior of a child can develop along with, rather than separate from, his cognitive growth. In so doing, support for the entire rationale for the K_1 structured program, which is concerned with social emotional and cognitive development, would obtain.

Since one of the goals of the K_1 program was to enhance the social development of children so that they might better function in the classroom, it was deemed appropriate to obtain the teacher's perception of the children's social behavior. As a result, a brief follow-up questionnaire was administered to each child's public-school teacher at the time of the follow-up testing at the end of the children's kindergarten year. Neither the teacher nor the interviewers knew which of the preschool programs the child had attended.

Inspection of the scores on the items relating to social development revealed that the two groups did not differ significantly on six of the eight items. On two of the items, one relating to the child's confidence in approaching new tasks and the other to the child's self-concept, the teachers rated the children who had attended the K_1 preschool significantly higher than the children who had attended the K_2 preschool. This finding is of special interest since the goals of the K_2 program express substantial concern for the social and emotional development of the child, yet the children who attended that program seem to have done somewhat less well than the children who attended the K_1 program. Although the evidence presented here should not be considered conclusive, it does support Weikart's (1967) point that programs directed at language and intellectual development are not only effective in achieving that goal but also effective on promoting social and emotional development.

A second concern, expressed by some, lies in the area of possible negative effects on work habits that might be fostered by a highly structured program. These critics feel that since the teacher maintains a high degree of control in a structured program, the children will not internalize good work habits and will subsequently demonstrate poor work habits in the less structured public school setting with its higher pupil-teacher ratio. Since one goal of the K_1 program is to develop the child's confidence and enjoyment of the learning situation, the findings on the six items of the questionnaire relating to work habits are most interesting. Substantial and significant differences in favor of the children who attended the K_1 program are found on all six of the "work habit" items in the questionnaire. In these aspects of behavior, so critical to effective functioning in the public school classroom, the children from the K_1 program are functioning at the "Usually" and "Always" levels, while the children from the K_2 program are functioning at the "Sometimes" level. From the foregoing data, it appears that the K_1 program resulted in social gains that were equal to or greater than those made by children in a K_2 program, in spite of the fact that the goals of the K_2 program expressly state that the acquisition of social skills is of prime importance.

Affective Area

One of the basic questions raised about the programs in early education is "What effect does the program have on the affective development of the child?" This question is raised most often when highly structured programs are being evaluated because the traditional belief about preschool is that children should be able to select, freely, the activities with which they will engage rather than being provided with teacher-selected activities designed to be interesting and appropriate yet stimulating in the cognitive and language areas.

One of the goals of the K_1 program is to enhance the affective, as well as the cognitive, development of the child. It is believed that structuring helps the child more readily discriminate that which needs to be learned from the less relevant aspects of the world about him so that he can learn more quickly and easily. Further, it is believed that children who learn in a setting where they receive positive reinforcement frequently, and who are helped to believe that they can learn something, will be positively oriented toward school and work and, thus, feel more positive toward themselves. Data was gathered on an incomplete sentence test to determine the effects of a structured program on the affective development of children and, if possible, to ascertain whether or not the K_1 curriculum did, in fact, enhance affective development.

Information pertinent to the affective development of children was gathered on subjects who had been previously enrolled in either the K_1 or K_2 programs (N = 24 in each group). At the time these data were collected, the subjects were in the mid-fourth-grade level.

Evaluation of these findings reveals that, contrary to popular belief, the children in the highly structured, cognitively based K_1 preschool curriculum were no more conflicted in their attitudes toward school than the children in the K_2 program. Further, if any trend might be evidenced it is that the children in the K_1 program had fewer conflicts in their attitudes toward school and therefore should be assumed to be better adjusted. For example, children in the K_1 program are likely to give responses such as "School is fun; is good for learning; does many things for you" rather than "School makes me sick; gives me a headache" or "Reading is my favorite subject; is fun" rather than "Reading is OK; is horrible."

One interesting question raised by a post hoc review of the completions is "What effect does a structured program have on a child's perception of his peers?" To the stem "My classmates _____," children might answer "Are my friends; play; are fun." They might, on the other hand, answer "Are smart; beat my in my work; are very good at math." A post hoc study of responses to this stem suggested that they might be scored along two dimensions: One, with regard to social acceptance and two, with regard to the extent to which the responses suggested that the child might be aware of the behavior of peers, especially achieving behavior. Comparison of the K_1 group with the K_2 children on the social acceptance subscale revealed almost identical means. This suggests no probable difference in the amount of positive social acceptance felt by the subjects.

In spite of dire predictions of negative effects of a structured program on the social and affective growth of children, these beliefs were not only refuted but the data suggest that the structured program significantly enhanced children's

functioning, at least in the social area. Thus, the data support the contention that the K_1 program significantly enhances the functioning of children in the cognitive, social, and probably the affective area. Serious consideration must, therefore, be given to the further study and implementation of structured programs.

How Long Must Intervention Be Continued to Stabilize Effective Functioning?

Only a partial response can be given to this question. It would seem clear that a single year of intervention, no matter how immediately effective, is not sufficient to stabilize acceleration in functioning (Karnes et al., 1969). As noted in the previous discussion, the children in the B-E program made continuing gains in the second year of this program; however, they experienced substantial losses the following year when special intervention was discontinued and when the children attended first grade in the public schools. Thus, it would seem that even two years is not sufficient.

What is the Most Strategic Age for Intervention?

Presented below are results of the four studies that were initiated to answer the question regarding the most strategic age for intervention.

K_1 Program Initiated at Age 3

The K_1 program was implemented with a group of three-year-old children and was continued for a two-year period (Karnes et al., 1968a). The results at the end of the first year of the study generally support the earlier initiation of the K_1 program. The first-year gains (16.9 IQ points for the younger group) essentially matched the remarkable gains made previously by the four-year-old children in the K_1 program (14 IQ points). After one year of intervention only one three-year-old child had a Binet IQ below 105 (it was 95). On seven of the nine ITPA subtests this group was performing at or above its chronological age; on three of these seven this group was performing substantially (6 to 8 months) above its chronological age. Apparently the K_1 program as modified for three-year-old children was appropriate and highly effective.

This rate of acceleration did not continue during the second year, but the gains made during the first year were essentially maintained. The acceleration achieved in one year represented a movement from deficit to nondeficit levels of functioning, and it may have been unrealistic to assume that such acceleration could be continued. Maintaining an essentially nondeficit performance may in itself represent a major achievement, particularly in view of the tendency of disadvantaged children in this and other projects to fail to maintain very promising first-year gains. The accerlerated rate of growth achieved during the first year and the demonstrated stability of these gains the second year suggest an optimistic school prognosis for these children.

Effects of the K_1 Program With a Class of Low IQ Children

Typically, mentally retarded children are not admitted to an organized program until age 6 or even later. A deliberate effort was made to identify and intervene with young (age 4) mentally handicapped children. Children from low-income families who obtained IQs ranging from 37 to 74 (mean IQ 66.4) were

provided with the Karnes cognitive program. After one year in the program the mean IQ of the group was 87.5, representing a 21 IQ point gain. The child with an original IQ of 37 obtained an IQ of 57 at the end of that year. He was kept in the K_1 preschool for two years, and at the termination of the year his IQ had increased to 84. He was discussed with personnel in the school system where he resided and was placed in a regular first grade with supportive help from a teacher of learning disabilities. At the close of his first grade attendance, he achieved a reading grade placement of 3.3 on the California Achievement Test. A follow-up at the third-grade level revealed that he was making good progress in a regular class.

After the subjects in this study had been three years in the public schools, a follow-up revealed that none of the children had been referred to a special class for the mentally retarded and that they were making good progress in regular classes. This finding is especially interesting since the community has comprehensive services for the retarded and since 70 to 80 percent of children in special classes for the educable mentally retarded are usually from low-income homes. Thus, preschool programs can well prevent many of such children from needing special class placement when they enter the elementary school.

Tutorial Infant Program

A tutorial study with infants was conducted under the direction of Samuel A. Kirk. Infants were tutored in the home by professional personnel for one hour a day five days a week for a period of two years. Mothers were involved little if any in this training program. At the end of the two-year period, Kirk reported that a 7 point IQ difference between his experimental and control groups was significantly higher (.05). Then, to test the hypothesis that tutoring in the home at the ages of 1 to 2 was more beneficial than intervention at ages three, four, and five, his home tutoring group was provided with a K_1 preschool program. At the age of 4, children who had received the Kirk home tutoring plus the K_1 preschool program at age 3 were compared with children who received only the K_1 program at age 3. The results reveal no differences between these two experimental conditions. Kirk states that the hypothesis that home tutoring at an earlier age is beneficial appears to be negated since equivalent results were obtained by placing children at age three for one-half day in a specialized preschool with a ratio of one teacher to five chilren.

Although the superiority of early intervention was not demonstrated, it may be that gains obtained by intervention through the mother would affect the child's total environment on a sustained basis and prove more stable and be reflected in later school progress. Kirk says, "It should be pointed out, however, that this experiment does not exclude the possibility of obtaining marked improvement in children when intervention is initiated in the home at the age of one and two, if the intervention consists of a program in the home that includes more than one hour of tutoring plus a program of parent training and parent participation. The present writer (Kirk) is convinced that a little intervention is not significantly beneficial, and that if results are to be achieved, the program must be a 'total push' program throughout the waking hours of a child over a four- or five-year period" (Kirk, 1969, p. 248).

Karnes Mothers' Training Program

Another study investigating strategic age for intervention (Karnes et al., 1968b) involved the training of mothers to teach their infants at home. This program was based on the assumption that the mother might serve as the primary agent in preventing deficits commonly associated with being a member of a low-income family. Over a two-year period, during weekly meetings, mothers from low-income homes were provided with a sequential educational program to use at home in stimulating the cognitive and verbal development of their children. They were given specific help in acquiring principles of teaching which stressed positive reinforcement. A toy and book lending library provided instructional materials for the mothers to use. In addition to these child-centered activities, each meeting devoted a portion of the time to mother-centered goals related to promoting a sense of dignity and worth as the mother demonstrated capabilities of self-help in not only the family setting but in the community at large.

The mean Binet IQ of the children whose mothers had worked with them at home was 16 points above that of children who had received no intervention. The ITPA performance of the experimental group closely approximated its chronological age, while that of the control group was nearly 6 months below its chronological age. Although the experimental and control groups were originally constituted on a random basis, this original control group was contaminated when ADC involved the mothers in a training program. Consequently, the above findings are based on a reconstituted control group. To provide another contrast group, the IQs of six of the experimental children were compared with that of older siblings who were tested at a comparable age before the mother had the benefits of a Mothers' Training Program. Comparability of rapport was sought by using the same psychologist for all of the children. A 28 IQ point difference in favor of the experimental subjects was obtained.

Although difficulties were encountered in constituting a comparable contrast group, the results of this study appear to support the effectiveness of the Mothers' Training Program in altering in positive ways the development of disadvantaged children before the age of 3. The 16-point Binet IQ difference between the experimental and control subjects of the Karnes study is equivalent to the 17-point Binet IQ difference between experimental and control groups of Schaefer (1969) research. In his project, graduate students tutored the infants one hour a day, five days a week, a design comparable to that of the Kirk study. While the results of the Karnes Mothers' Training Program, as reflected in the accelerated growth of the infants, appears promising, similar results were obtained in less time using a structured classroom approach (K_1) started at age 3. It could be that gains made by children through the mother had a better chance of being sustained; however, data to test this hypothesis are not available for analyses. Greater differences were found between the experimental subjects and their siblings (the 28 points mentioned above) than between the infant groups in the short-term study.

Can a Structured Program Be Implemented by Paraprofessionals, Classroom Teachers, and Mothers at Home?

Training of Mothers of Three- and Four-Year-Old Children

The first attempt to answer this question was a pilot study conducted with mothers of three- and four-year-olds from low-income families in which the

children were not enrolled in a preschool program (Karnes et al., 1968b). The mothers of the experimental children attended eleven weekly two-hour meetings. At the beginning of each session the mothers made educational materials to use during the following week in teaching their children at home. Inexpensive materials or items commonly found in the home were incorporated into these activities. The teachers taught the mothers appropriate songs and fingerplays and distributed copies of the words as a teaching aid at home. In addition, books and toys were available on a lending-library basis. Generally, materials were chosen to stress useful vocabulary, basic manipulative skills, and mathematics readiness concepts. Language development was the major emphasis of all activities, which were designed to teach the child the words he needs to label the objects in his immediate environment, to make more precise verbal observations, to generalize, to use grammatically correct forms, to understand and to ask questions, and to formulate answers.

When a mother was absent, the other mothers made the materials for her and the teacher delivered these and the instructions for their use to the home the following week. In addition, the teacher visited each home at two-week intervals to become acquainted with the child, to demonstrate teaching techniques, to evaluate the appropriateness of the activities by observing mother and child at work, and to assess the extent to which mothers were working with their children.

Experimental subjects evidenced significant gains in intellectual functioning as measured by the Stanford-Binet Intelligence scale. The mean gain of the experimental group was 7 points, while the control group remained unchanged. The ITPA gains of the experimental group exceeded those of the control group by two to eight months on seven of the nine subtests. On eight of the nine subtests the gains of the experimental group were at least twice the program interval of approximately three months.

The results of the previously discussed study on training mothers of infants also confirms the hypothesis that mothers can be trained to effectively implement a preschool program at home.

Paraprofessionals as Classroom Teachers

Another study directed by Karnes (et al., 1970a) was designed to determine whether a paraprofessional teaching staff indigenous to the poverty area could, through sustained inservice training and daily supervision, implement the highly specific instructional program developed in the K_1 preschool. Intervention effectiveness was evaluated by comparing the performance of a standardized test battery on children taught by paraprofessionals with that of children taught by professional staff implementing the same instructional program. One class was staffed by three young Negro mothers who had no previous teaching experience and no formal education beyond high school. Another was taught by sixteen- and seventeen-year-old girls enrolled in a high school work-study program. In addition, a qualified preschool teacher served as the paraprofessional trainer in each of the latter two classes. This study, then, goes beyond the feasibility of employing paraprofessional staff in peripheral positions and addresses itself to the question of whether such staff can be trained to assume the major responsibilities for implementing a preschool instructional program.

The staff variables explored in this study (professional, adult paraprofessional, and teen-age paraprofessional) did not produce significantly differntial performances on any component of the evaluation battery. The results of this study clearly endorse the feasibility of alleviating preschool staffing problems through employing paraprofessional teachers who receive sustained inservice training and daily supervision. The paraprofessionals, adult and teen-age, who participated in this study did indeed demonstrate the ability to implement the highly specific instructional program developed in the K_1 preschool as effectively as professionally trained teachers.

I might have been assumed that implementing a highly structured instructional program would make the training of paraprofessional staff even more arduous. This did not prove to be the case. The supervisor of the adult paraprofessionals felt that the choice of the K_1 curriculum may have been critical to the success of the program. Structured programming proved to be a rather ideal vehicle for training paraprofessionals: (1) The paraprofessional teacher approached her teaching with confidence since she knew precisely what she was to do. (2) She was able to evaluate immediately her effectiveness as a teacher by observing the child's performance on defined tasks. (3) She could see the specific results of her efforts in the day-to-day development of the children. Although these observations were required to implement the structured curriculum, they also served to reward teaching efforts by emphasizing child growth.

Summer Sibling Training Projects

For three successive summers, young teen-agers (12 to 16 years of age) from low socio-economic homes were trained to tutor their younger brothers and sisters. The programs were conducted by experienced teachers who selected activities from the Karnes (K_1) curriculum and trained the teen-agers to use these activities to teach their three-to-four-year-old siblings. Each summer the program for training the siblings varied in some important respects (Karnes et al., 1970a). While these programs were of short duration, research data did indicate that experimental children taught by the teen-agers in at least two of the three programs made significant IQ gains during the six-to-eight week tutoring period (10 and 7 Binet IQ points gain). Several positive effects were noted during the course of these training programs. The teen-agers enjoyed working in the program and seemed to gain self confidence as they acquired effective teaching skills. One girl who initially had low esteem and who was having difficulty in school said, "No one ever expected me to do anything. I found out I could do something." Another said, "It is hard to be a teacher. I didn't know it was so much work." Apparently this experience affected positively the teen-agers' attitudes toward school. This program has important implications as a potential source of manpower for day care and Head Start programs. These teen-agers are often in frequent contact with their younger siblings and are a resource for positively influencing the development of younger children.

As a result of the studies using paraprofessionals as teachers in the classroom and at home, and the inclusion of the teen-ager as a tutor for younger siblings, Karnes and her associates have developed a theoretical "Paraprofessional Educator Manager (PEM) Model" (Karnes et al, 1971a). The role of the PEM is to supervise and coordinate activities of the paraprofessional teachers and home

visitors. As the individual responsible for both the paraprofessional teacher and home visitor, a PEM is able to ensure that the activities for the child in the home and school are integrated.

Current Research Efforts

A Material Development and Evaluation Project with Four-Year-Olds with Higher IQs from Low-Income Families

Concern for what happens to the higher IQ children from low-income families in subsequent years was accentuated when it was discovered, as pointed out earlier in this paper, that the children with the highest IQs who had been in the K_1 program failed to achieve at a rate consistent with their entering IQ status. In an effort to better prepare four-and five-year-old children from target areas for subsequent schooling, a curriculum is being developed based on Guilford's (1967) Structure of the Intellect. Two approaches are being used to evaluate the program. One focuses on the assessment of the curricula in the form of lesson plans and the other on the development of the children. The effect of the program on the child is being assessed using both formative and summative data, an improvement over the earlier studies that used only summative evaluation. It is too early to determine the worth of this approach; however, formative data suggest that the lesson plans drawn from a pool of 340 that have been developed using the SI model are effective with these young children. This program is being supported by the Illinois Gifted Program, Office of the Superintendent of Public Instruction.

A Model Program for the Early Education of Handicapped Children (Precise Early Education of Children with Handicaps (PEECH)

As an outgrowth of the work with young disadvantaged children, a program for the multi-handicapped (ages 3 through 5) was initiated in the fall of 1970 with supporting funds from the Bureau of Education for the Handicapped (Karnes et al., 1970b). The children served were typically excluded or dropped from existing programs in the community because of the seriousness and complexity of their handicaps. The children were drawn from a wide range of socio-economic levels with two or more handicapping conditions, one of which was functional mental retardation.

Visitors to the program (administrators, supervisors, consultants, teachers, ancillary personnel, paraprofessionals, parents) will be able to observe the following:

1. The implementation of curricula which apply developmental guidelines to the special needs of individuals with severely handicapping conditions. Behaviorally described objectives are one unique feature of the curriculum. Embedded (concurrent) evaluation is another.

2. A model process for involving family members in the direct evaluation of their handicapped child.

3. A model training program (pre- and inservice) for (a) staff members and (b) paraprofessionals, including teachers in the classroom.

In addition, the following will be provided to the visitors who plan to implement the program:

1. Model lesson plans (185) in the following areas: Fine motor, social, cognitive, self-help, language, directed play, art, gross motor, and music.

2. An evaluation plan which can be implemented in a local site using paraprofessional evaluators.

3. A blueprint for a model playground for the handicapped.

4. A plan for inservice training of paraprofessionals.

5. Video tapes of various facets of the program.

The assumptions underlying this educational program for young handicapped children are:

1. An effective educational program must be developmentally based and its implementation must be structured and individualized;

2. The earlier the handicapped child and his family are involved in an intervention program, the greater the potential for enhancement of their subsequent development;

3. Gains (intellectual, social, and emotional) made during the early years can have a cumulatively beneficial effect in subsequent years;

4. Increasing the child's level of cognitive functioning will enhance his ability to perceive and cope with his environment, thus maximizing his social and emotional growth;

5. A high teacher-pupil ratio is a requisite of an early education program;

6. The services of the limited number of competent professionals can be extended through the use of paraprofessionals as teachers;

7. Effective programs for the handicapped child require on-going staff development activities.

In contrast with earlier research efforts, this program is carefully evaluated on a formative level as well as on a summative level. The major components being evaluated are (1) classroom, (2) parent involvement, (3) inservice training, (4) administration, and (5) dissemination. An outside evaluator evaluates the evaluation of the project. The major goal of the project is to have the program replicated in 10 sites durint rhe 1971-1972 school year and in 20 additional sites during the 1972-1973 school year.

The dissemination component of this project has great promise for bridging the gap between research and practice. A well developed plan for delivery of the program to the field entails a full-time disseminator on the staff who interprets the program to visitors, a training program to provide staff for implementing the program, and a follow-up plan to help directors interpret the program in their own community and to replicate the program. Coordination with the Department of Mental Health ensures complementary support for delivery to the field. The fact that Illinois now has mandatory legislation which requires providing for handicapped children as young as 3 years of age helps ensure the success of the delivery plan.

While the program has been in progress for only a year and a half, a number of the children in the demonstration center have progressed to the extent that they no longer function in the retarded range. The behavior of the children has markedly improved to the extent that several have been able to leave the project and enter a public school or a preschool for normal children.

Implications of Findings on Comparative Studies

A careful study of the findings of these various studies suggests the following implication for early education of young children, especially those from low-income homes:

1. One year of intervention during the preschool years is not sufficient to ensure sustained gains in subsequent years.

2. Parents from low-income families can acquire improved skills in teaching their children in the home. Thus, various delivery systems should be open to parents, some of which may very well be home based.

3. Since parents can learn to enhance their child's rate of development, preschool programs should have a strong parent involvement component.

4. While the age for most effective intervention has not been conclusively determined, there is evidence that early intervention (as early as infancy) can significantly accelerate the development of children from low-income homes.

5. Paraprofessionals from target areas, if supervised by a professional person, can serve as teachers in the classroom and promote as great a development in the children as an all-professional staff does.

6. A structured program such as Karnes' does not impede the development of social, emotional, and affective development; in fact, the contrary can be anticipated.

7. Early intervention can ameliorate learning deficits in children and prevent the need for putting many children from low-income homes into special classes.

8. Persons attempting to accelerate the development of infants should give careful consideration to working through the mother by enhancing her skills rather than providing professionals to work directly with the infants, for two reasons:

(a) training the mother has greater promise not only for accelerating the infant's development but also for helping her sustain his gains; (b) tutoring infants is not feasibly practical.

9. Generally, structured, cognitively based programs with a high level of verbal interactive behavior seem to have the greatest impact on the intellectual functioning and academic progress of children from low-income homes.

10. Curricula which stress acquisition of information-processing skills seem to ensure transfer of learning to a greater extent than those which have as a primary goal the acquisition of content.

11. To determine the differential effects of various program models, formative evaluation must be undertaken.

12. Training young teen-agers to teach their younger brothers and sisters can be successfully accomplished and is an important resource that should be tapped in day-care programs, Head Start, and public-school-based preschool programs. An exploration of the effect of such activities on the teen-agers themselves may show positive results.

13. Teacher-training institutions must prepare teachers to work effectively with paraprofessionals who teach in the classroom and work in the home.

14. Attention to individual differences, precise planning, inservice education, parental involvement, and on-going evaluation appear to be important components of any preschool program, especially for the disadvantaged and handicapped.

15. Children with higher IQ from the low-income strata will need special early programming if they are to attain their potential.

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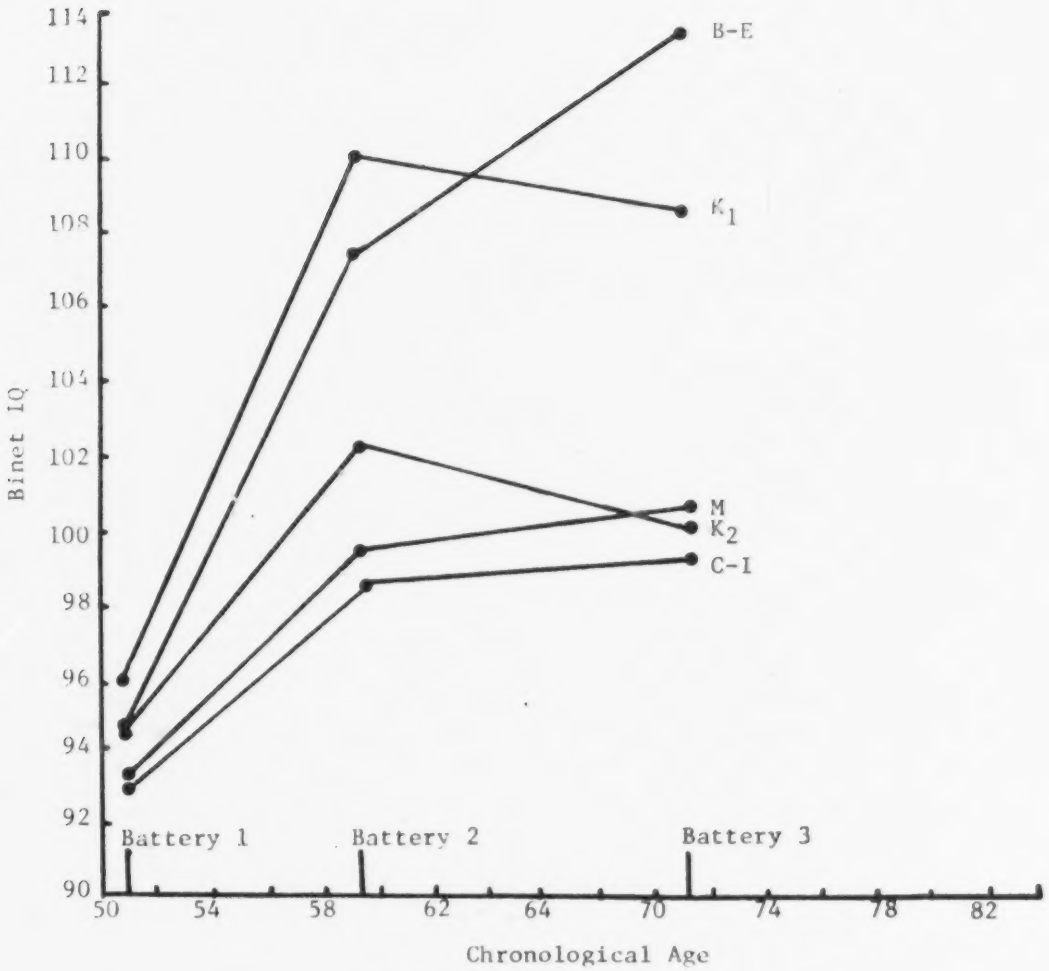
FIGURE 1

Stanford-Binet IQ
Five Groups for Two Years



Note: The times of the three batteries were plotted at the mean Binet chronological age of the three groups.

FIGURE 2

DIFFERENCE SCORE MEANS FOR THE THREE ITPA SUBTESTS

IN WHICH THE FIVE GROUPS DEMONSTRATED THE GREATEST INITIAL DEFICIT

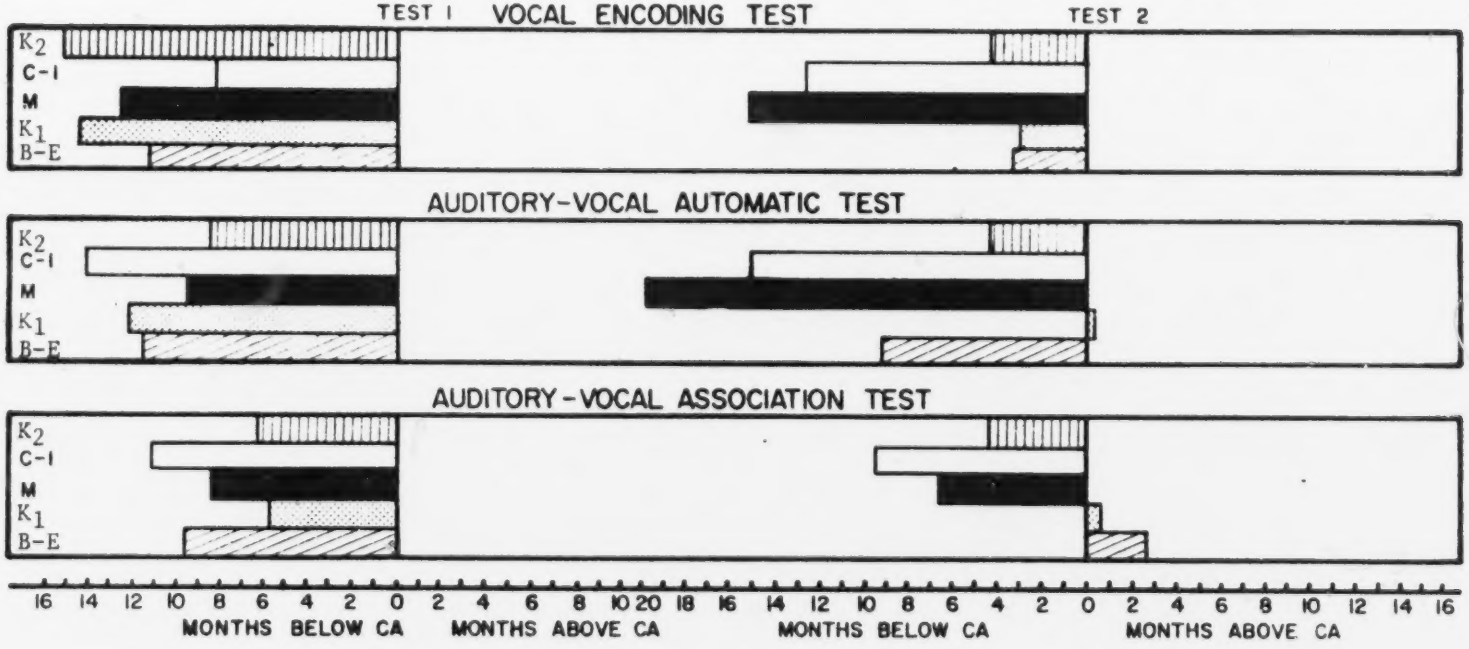

TEST 1
VOCAL ENCODING TEST
TEST 2
K2
C-1
M
K1
B-E
AUDITORY-VOCAL AUTOMATIC TEST
AUDITORY-VOCAL ASSOCIATION TEST
16 14 12 10 8 6 4 2 0 2 4 6 8 10 20 18 16 14 12 10 8 6 4 2 0 2 4 6 8 10 12 14 16
MONTHS BELOW CA
MONTHS ABOVE CA
MONTHS BELOW CA
MONTHS ABOVE CA

FIGURE 3

Combined ITPA Verbal Expressive
(Verbal Expression, Auditory Vocal Automatic, Auditory Association)
Difference Score Means--Five Groups for Two Years

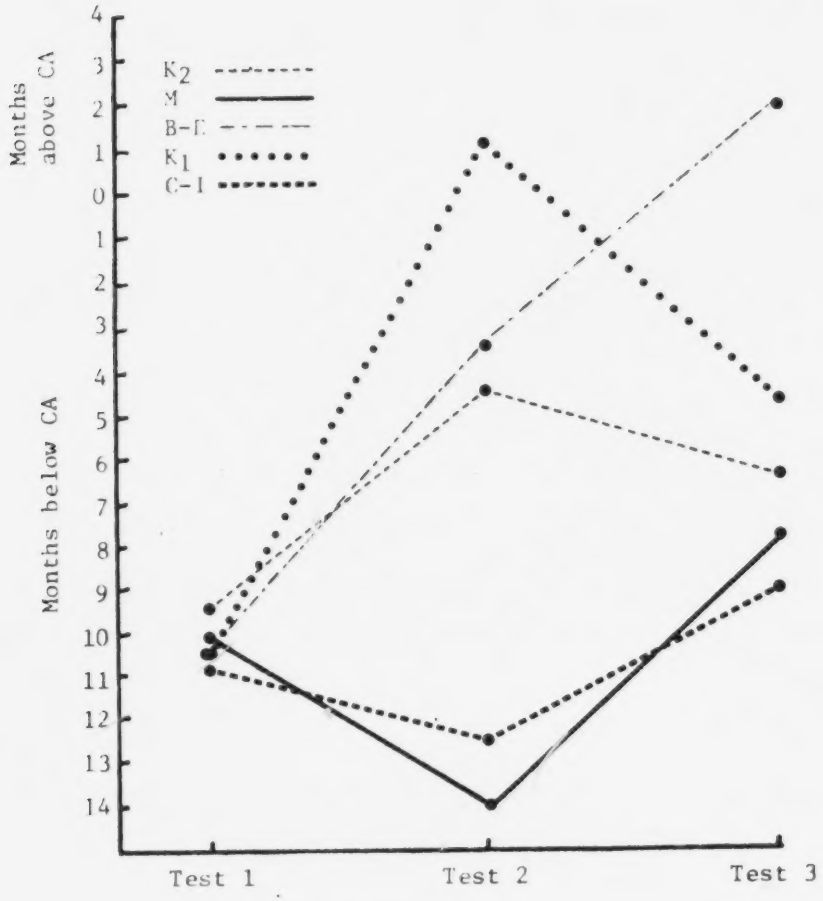


FIGURE 4

Stanford-Binet IQ

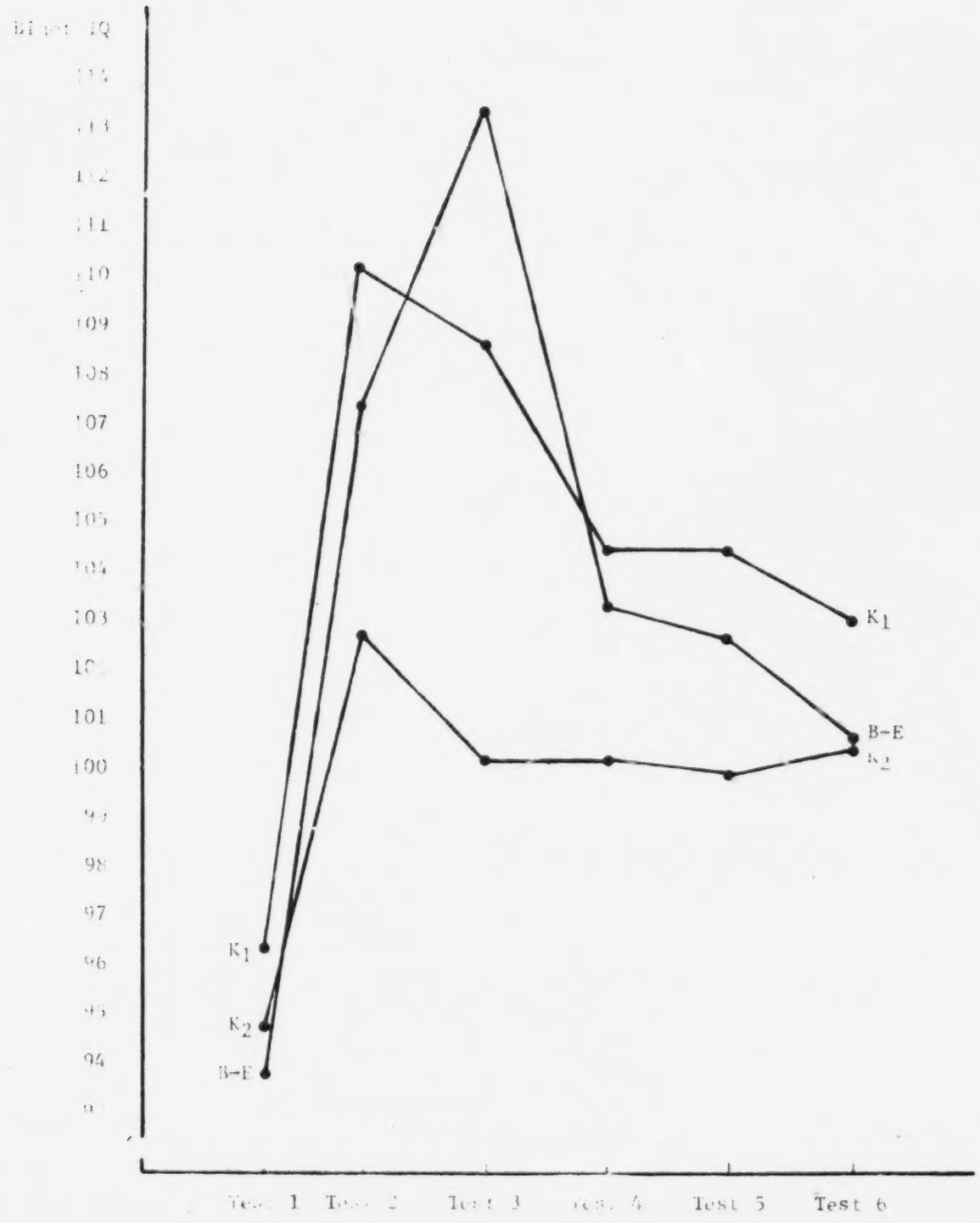
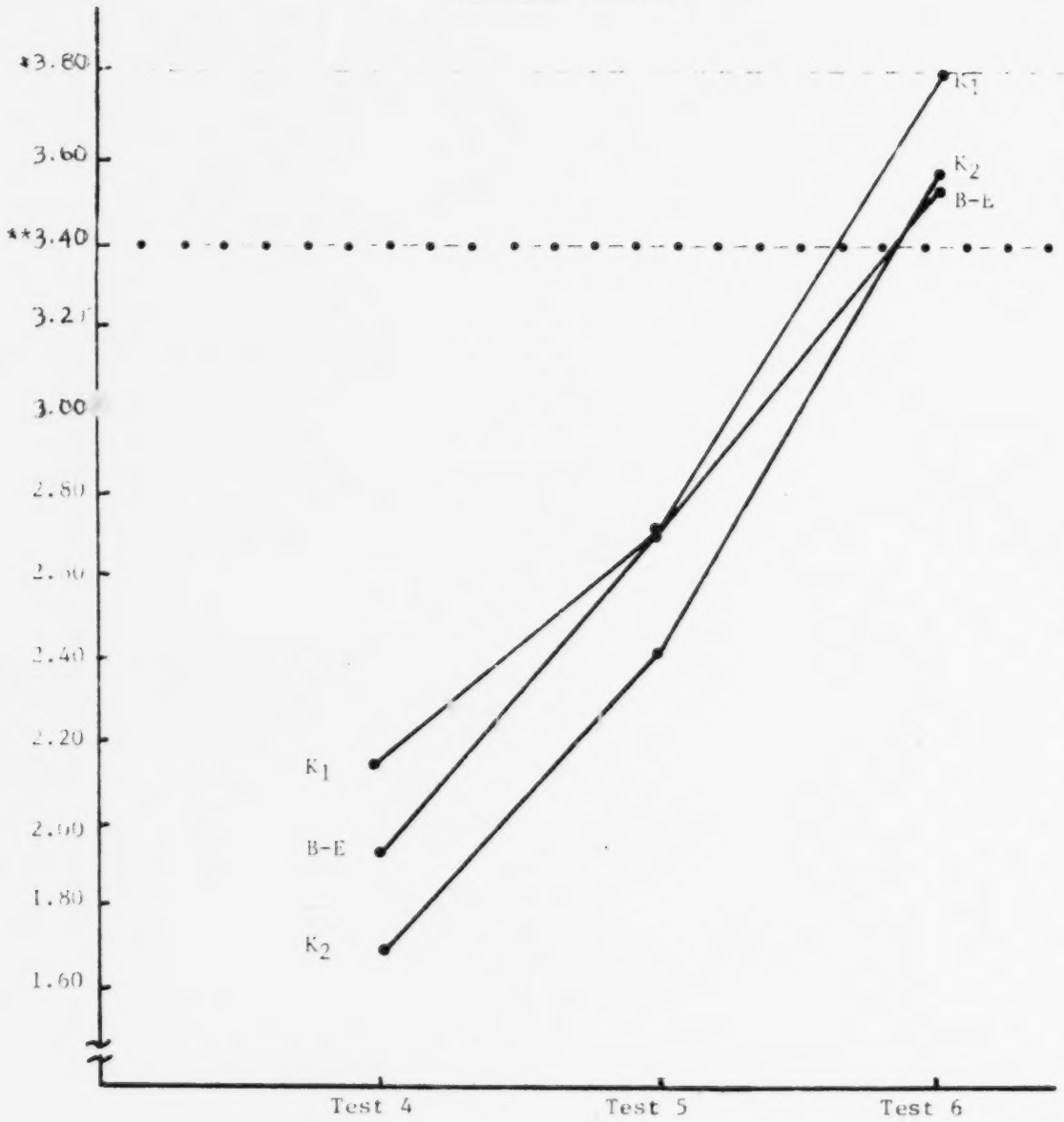


FIGURE 5

California Achievement Test
Total Reading Grade
Placement Scores



* — — — — — represents grade expectancy based on month of testing and initial mean IQ of K_1.

** —•—•—• represents grade expectancy based on month of testing and Test 6 mean IQ of K_1.